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EXAMINER

MCLOUGHLIN, MICHAEL I

ART UNIT

PAPER NUMBER

2662

DATE MAILED: 10/24/2003

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Please find below and/or attached an Office communication concerning this application or proceeding.

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Office Action Summary

Application No.

09/629,219

Applicant(s)

SHABTAY ET AL. 

Examiner

Michael I McLoughlin

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– The MAILING DATE of this communication appears on the cover sheet with the correspondence address –

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-49 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1- 49 is/are rejected.
- 7) ☒ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 July 2000 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) g.
- 4) ☐ Interview Summary (PTO-413) Paper No(s) ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the elements listed below must be shown or the features canceled from the claims. No new matter should be entered.

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

- Claims 1-13, and 48 includes a multicast routing table, therefore a **multicast routing table** must be shown, and;
- Claims 26-37 include a bridging unit, therefore a **bridging unit** must be shown, and;
- Claims 26-37 include a multicast detector, therefore a **multicast detector** must be shown, and;
- Claim 34 includes layer-3 routing unit, therefore **layer-3 routing unit** must be shown;
- Claim 37 includes subscription information, therefore **subscription information** must be shown;
- Claim 38 includes a layer-3 output unit; therefore a **layer-3 output unit** must be shown.
- Claim 48 includes a multicast routing unit; therefore a **multicast routing unit** must be shown.

Claim Objections

2. Claim 4 is objected to because of the following informalities: The phrasing “substantially each entry a legal interface” makes this claim very awkward to read. The examiner believes that the applicant means to add a limitation called “legal interface” to each entry in the routing table. Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 4 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The term “legal interface” that is intended to identify an attribute in addition to VLAN and port is not defined in the specification, and the term “legal interface” is not found in any prior art associated with VLAN multicasting. What is the intended attribute of this term?

Claim Rejections - 35 USC § 102

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-25, 38, 39, 41-44, 45-47, and 48 are rejected under 35 U.S.C. 102(e) as being anticipated by Gleeson et al. (U.S. 5,959,989), hereinafter referred to as Gleeson.

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Regarding claim 1, Gleeson discloses a method of determining local multicast information of a LAN comprising:

- Dividing the LAN to a number of segments larger than the number of VLANs in the network as shown in figure 2A that has 5 VLANs (Red, Blue, Green, Orange, and Yellow) and 27 segments (such as, Red, Green, and Blue segments in trunk line 231), that includes intermediate devices 220-223 that are capable of establishing segmented VLANs by associating various groups of LANs 204-214 (see column 8 lines 4-6), and;
- Creating a layer-3 multicast routing table, which relates to each of the segments separately where Gleeson's routing table includes: a VLAN designation table 240, a group forwarding table 250 (see figures 2B and 2C respectively), a subscription table 308, and a VLAN table 312 (see figure 3).

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Regarding claim 2, Gleeson discloses listing in each of the routing table entries the segments to which the matching packets should be routed where the segments are the multicast VLAN identifier for each entry in the VLAN table 312 of figure 3 (also see associating a given segment of network 200 in column 8 lines 13-14).

Regarding claim 3, Gleeson discloses the layer-3 routing table identifies interfaces according to VLAN and port (referring to figure 2B this is the VLAN designation and port number of the VLAN designation table 240, respectively).

Regarding claim 4, although as cited above the term “legal interface” is not defined in the specification, the examiner believes this attribute relates to identifying a port that has valid subscribers or registered users of each VLAN, and Gleeson discloses identifying subscribing VLAN ports in the forwarding table 250 of figure 2C and the subscribing physical interface in the subscription table 308 of figure 3, further Gleeson discloses identifying subscribing entities without VLAN designations in the subscription table 308 of figure 3.

Regarding claim 5, Gleeson discloses dividing the LAN to a plurality of segments such that some segments are physically distinct such as segments for Red, Green, and Blue within trunk line 231 of figure 2A.

Regarding claim 6, Gleeson discloses dividing VLAN Orange (O) of the LAN into a plurality of segments on LANs and trunk lines 207, 230, 232, 234, and 210 of figure 2A.

Regarding claim 7, Gleeson discloses dividing such that there is a separate segment for each VLAN on a group of links such as, VLANs Orange, Green, and Blue that pass on trunk line 231 between Layer-3 switch 221 and router 226.

Regarding claim 8, Gleeson discloses a backbone segment such as 230 in figure 2A that includes all the links for each VLAN that connect switches 220 and 221. Gleeson disclosing that external ports are used on 230 implies this backbone segment. However, this is explicit

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in figure 1 of U.S. 5,394,402 (which is disclosed by Gleeson on line 52 of column 8 and incorporated by reference in it's entirety).

Regarding claim 9, Gleeson divides each VLAN such that non backbone segments connect one or more hosts to each layer-3 switch, such as 208 in figure 3A that connects 3 hosts in the Green VLAN to layer-3 switch 221. Gleeson disclosing that internal ports are used on 230 implies this non-backbone segment. However, this is explicit in figure 1 of U.S. 5,394,402 (which is disclosed by Gleeson on line 52 of column 8 and incorporated by reference in it's entirety).

Regarding claim 10, Gleeson discloses managing multicast related information for each of the segments separately and determining whether multicast packets should be routed to the segment in detail throughout the description of the preferred embodiment section from line 50 of column 7 through line 18 of column 19. Specifically see column 11 lines 38-40 where MND228 of figure 2A, which is configured to distribute messages along the orange and yellow VLAN segments generates a second MVLAN ID.

Regarding claim 11, Gleeson discloses that the multicast management conforms to IGMP in line 63 of column 8.

Regarding claim 12 and 13, Gleeson discloses layer-2 functions throughout the description with reference to multicast network devices (MND) that are introduced in line 56-57 of

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column, where the MND is preferably included in the intermediate devices (layer-3 switches) as disclosed in lines 27-37 of column 18, and in column 19 discloses that MNDs may be enabled or disabled. Thus, when the MND is disabled layer-2 functions of routing and filtering is not performed.

Regarding claim 14, Gleeson discloses a method of forwarding multicast packets by an intermediate device 222 (layer-3 switch) as shown in figure 2A, comprising:

- receiving a multicast packet by intermediate device 220 through a first physical port (port 4) on a first VLAN (Orange VLAN); and
- routing the multicast packet in a layer-3 out a second physical port (port 1 or port 3 of 222) of the switch, on the Orange VLAN.

Regarding claim 15, Gleeson discloses decrementing (reducing) the time to live (TTL) in column 13 on line 52.

Regarding claim 16, Gleeson discloses that the second physical port leads to at least one layer-3 switch or router (referring to figure 2A, the second port would be port 1 to router 228 or port 3 to intermediate device 223).

Regarding claim 17, Gleeson discloses that the multicast packet is not bridged in layer 2 through the second physical port (port 1 or port 3 of 222 of figure 2A with MND disabled as cited above in claim 13).

Regarding claim 18, Gleeson discloses that the multicast packet is bridged in layer-2 through a third port (port 2 of 222 with MND enabled).

Regarding claim 19, referring to figure 2A Gleeson shows an illustrative network (see column 7 line 50) using examples (see column 7 line 62) of the disclosed layer-3 switch (220, 221, 222, and 223) that have external ports between the layer-3 switches such as port 3 of 220 and internal ports such as port 5 of 220. Expanding the illustrative network with a layer-3 switch that has only external ports would result in the multicast packet not being bridged in through any port of the switch.

Regarding claim 20, Gleeson discloses a method of forwarding multicast packets within a single VLAN (Green VLAN), comprising:

- receiving multicast packets by a first switch connected to the VLAN (receiving multicast packets on port 4 of 220 in figure 2A);
- routing multicast packets in layer-3 to a second switch connected to the VLAN (221 of figure 2A connected to the Green VLAN via port 1)
- routing the multicast packets in layer-3 by the second switch (221 of figure 2A) through an interface included in the VLAN (port 3 included in the Green VLAN).

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Regarding claim 21, Gleeson discloses routing multicast packets in layer-3 by the second switch (221 of figure 2A) comprising routing to a host (H on LAN 208) connected to the Green VLAN via port 5.

Regarding claim 22, Gleeson discloses routing multicast packets in layer-3 by the second switch (221 of figure 2A) comprises routing to a third switch (222 of figure 2A) connected to the Green VLAN via port 3.

Regarding claim 23, Gleeson discloses forwarding multicast packets within a single VLAN (Orange VLAN), comprising

- receiving multicast packets of a specific destination address and source address by a first switch connected to the VLAN (switch 222 of figure 2A receiving multicast packets on port 2 structured per figure 4D addressed for the Orange VLAN)
- routing the received multicast packets in layer-3, by the first switch to at least one first host connected to the VLAN (switch 222 of figure 2A routing multicast packets to the host 35 on LAN 214 of figure 2A connected to the Orange VLAN);
- receiving multicast packets of the specific destination address and source address by a second switch connected to the VLAN, and (switch 223 of figure 2A receiving multicast packets on port 1 structured per figure 4D addressed for the Orange VLAN);

- routing multicast packets in layer-3 by the second switch, to at least one second host (switch 223 routing multicast packets to a either host on LAN 213 of the Orange VLAN connected via port 2).

Regarding claim 24, Gleeson discloses the first switch of the Orange VLAN (22 of figure 2A) is directly connected to at least one first host (host 34 directly connected to port 4).

Regarding claim 25, Gleeson discloses routing multicast packets from the first switch to the second switch (routing from switch 222 to 223 of figure 2A).

Regarding claim 38, Gleeson discloses a layer-3 switch (intermediate devices 221-223 of figure 2A), comprising:

- at least one VLAN interface which does not have an associated IP router interface (port 3 of 221 in figure 2A not associated with IP router 226 connected to 221); and
- a layer-3 output unit which directs IP packets with a MAC source address of the switch through at least one VLAN interface (port 3 of 220 in figure 2A which directs IP packets with the format of figure 4C with the MAC source address 415, and see column 12 lines 36-44).

Regarding claim 39, Gleeson discloses wherein the packets directed through the at least one VLAN interface (port 3 of 220 in figure 2A) include IP packets routed by the switch in layer

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3 to the appropriate IP groups when MND is enabled as disclosed in column 13 lines 19-38 that describes the MND.

Regarding claims 41 and 42, Gleeson discloses wherein the packets directed through the at least one VLAN interface (port 3 of 220 in figure 2A) include IP packets of a routing protocol (DVMRP, PIM-SM, or PIM-DM see column 9 lines 23-26), and these protocols include multicast packets.

Regarding claim 43, Gleeson discloses packets directed through the at least one VLAN interface (port 3 of 220 in figure 2A), include IP multicast routing related control packets (such as join and leave, see column 9 line 65).

Regarding claim 44, Gleeson discloses the layer- 3 output unit directs packets through the at least one VLAN interface (port 1 of 220 in figure 2A), with an IP source address associated with a different VLAN interface of the switch (ports 1, 2, 4, 5 of 220 in figure 2A).

Regarding claim 45, Gleeson discloses a method of forwarding packets, comprising:

- receiving a packet with a source MAC address (receiving frame 402a at a switch, see column 12 line 40) and a TTL value (see column 13 line 52);
- changing the source MAC address of the received packet (converting to frame 610 of figure 6), and

- forwarding the packet with frame 610 but with the same TTL value (Gleeson discloses in lines 52-52 of column 13 that the switch may decrement the TTL value indicating that the switch may not participate or disable decrementing the TTL value that would result in maintaining the same value at a non participating node).

Regarding claim 46, Gleeson discloses receiving a packet 402a (see figure 4A) at switch 220 of figure 2A comprising an IP multicast packet generated by Red VLAN entity 27 (see column 12 lines 21-32).

Regarding claim 47, Gleeson discloses forwarding (drives a copy) the packet received from Red VLAN entity 27 cited above within the Red VLAN onto ports 3 and 5 of switch 220 in figure 2A (see column 12 lines 45-65).

Regarding claim 48, Gleeson discloses a switch, comprising:

- a plurality of ports as shown in switches 220-223 in figure 2A;
- a layer-3 multicast routing table, which identifies interfaces to which multicast packets should be routed according to both VLAN and port (see 250 in Figure 2C); and
- a multicast routing unit (multicast controller 306 in figure 3) which routes multicast packets between the ports of the switch based on entries of the multicast routing table.

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 26-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gleeson as applied to claims 1-25 above, and further in view of Mazzola et al. (U.S. 5,796,732, hereinafter referred to as Mazzola).

Regarding claim 26, Gleeson discloses a switch, comprising: a plurality of ports (see switches 220-223 in figure 2A, MAC address and their VLAN (see 240 of figure 2B), a multicast detector (multicast controller 306 of figure 3) which identifies a group of at least some of the multicast routing related packets received by the switch, and the group including IGMP queries (participating in IGMP messaging, see column 16 line 16). However, Gleeson does not explicitly teach bridging. Mazzola teaches bridging in column 11 on lines 12-24, and highlights its advantage of flexibility and a blocking feature. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Gleeson's switch and incorporate the bridging taught by Mazzola. One would have been motivated to make this modification in order to increase flexibility have the blocking feature, and Gleeson in view of Mazzola would result in the claimed invention:

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- a layer-2 bridging unit (EARL circuit 300 of figure 1 in Mazzola) which bridges packets between the ports responsive to their MAC address and their VLAN; and
- and prevents the layer-2 bridging unit from bridging the identified packets through ports which do not lead to at least one neighboring layer-3 switch or router (a subset of ports, see column 11 line 18).

Regarding claim 27, Gleeson in view of Mazzola discloses preventing bridging through any ports of the switch (selects no ports as destinations, see Mazzola column 11 line 20).

Regarding claims 28, 29, and 30, Gleeson in view of Mazzola discloses bridging at least some of the identified packets through a plurality of ports in the subset of ports cited above in claim 26.

Regarding claim 31, Gleeson discloses supporting DVMRP, and PIM-SM, and PIM-DM in column 9 lines 23-26, and with multiple protocols it is inherent that the switch be responsive to the protocol.

Regarding claims 32 and 33, Gleeson discloses in column 9 lines 16-34 discloses distributing multicast messages (that includes control and routing related packets) wherein the group of packets identified by the multicast detector (multicast controller 306, see figure 3) comprises substantially all the IP multicast packets received by the switch (this is a switch configured in

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a similar manner to MND 226 of figure 2A that is configured for all its VLANs or Red, Blue, and Green, see column 9 lines 18-19).

Regarding claim 34, Gleeson discloses layer-3 routing unit (multicast controller 306, see figure 3), which routes at least some IP multicast routing related packets between ports of the same VLAN (Ports 1, 2, 3, and 5 of 221 in figure 2A for the Green VLAN).

Regarding claims 35, 36, and 37, Gleeson in view of Mazzola disclose the multicast detector (multicast controller 306 of figure 2A in Gleeson) that prevents the layer-2 bridging to all ports (see Mazzola column 11 line 20) irrespective of IP destination address, MAC destination address, or subscription information.

8. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gleeson as applied to claims 38 above, and in view of Jain et al. (U.S. 6,614,787), hereinafter referred to as Jain. Gleeson discloses a switch according to claim 38, wherein the packets directed through the at least one VLAN, by the layer-3 output unit, includes IP packets, but fails to teach these packets being generated by a higher layer of the switch. Jain teaches layering a VLAN network as shown in figure 2 with switch 202 being a higher layer switch (see column 9 on lines 27-28) than layer-3 switch 204 (see column 6 lines 7-8), and as such packets generated by switch 202 are a higher layer than switch 204. Modifying Gleeson's switch to add the layering taught by Jain would have resulted in the claimed invention. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Gleeson's switch with the

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layering taught by Jain in order to have the "shortcut" cited by Jain (see column 9 line 14) that differentiates sections of the network and simplifies routing processes.

9. Claim 49 is rejected under 35 U.S.C. 103(a) as being unpatentable over Gleeson as applied to claims 48 above, and in view of Oguchi et al. (U.S. 6,625,685), hereinafter referred to as Oguchi. Gleeson discloses a switch according to claim 38, wherein the layer-3 multicast routing table may operate in a first mode in which interfaces are identified by both a VLAN and a port, but fails to teach a second mode in which interfaces are identified only by a VLAN. Oguchi teaches a switch with a point-to-point type interface (see column 9 lines 18 and 19) wherein the routing table operates by identifying VLAN only (see figures 4 or 5). Modifying Gleeson's switch to add routing with VLAN only taught by Oguchi would have resulted in the claimed invention. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Gleeson's switch with Oguchi's teaching. The motivation for this modification is most exemplified in a network that mixes a switched backbone network with tail circuits that are point-to-point circuits that would not require switching between ports only direct routing and the end devices on these tail circuits would be greatly simplified and cost reduced by removing the switching circuitry that would not be needed.

Conclusion

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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- 1) Wesley et al. (U.S. 6,104,695), Repair TTL computation and correction mechanism to perform localized repairs in a multicast data distribution setup/framework.
- 2) Flanagan (U.S. 5,506,838), Packet propagation and dynamic rout discovery apparatus and techniques.
- 3) Hendel et al. (U.S. 5,920,566), Routing in a multi-layer distributed network element.
- 4) Hendel et al. (U.S. 6,081,522), System and method for a multi-layer network element.
- 5) Hendel et al. (U.S. 6,088,356), System and method for a multi-layer network element.
- 6) Hendel et al., Mechanism for packet field replacement in a multi-layer distributed network element.
- 7) Hiscock et al. (U.S. 6,181,681), Local area network media access controller layer bridge.
- 8) Pitcher et al. (U.S. 6,370,142), Method and apparatus for performing per-port IP multicast pruning.
- 9) Tang et al. (U.S. 6,553,028), Method and apparatus for multicast switching using a centralized switching engine.
- 10) Hegde (U.S. 7,570,875), Automatic filtering and creation of virtual LANs among a plurality of switch ports.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael I McLoughlin whose telephone number is 703-308-7911. The examiner can normally be reached on weekdays 7AM - 3:30PM.


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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Ngo can be reached on 703-305-4798. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4700.

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October 15, 2003


RICKY NGO
PRIMARY EXAMINER